DOCUMENT RESUME

ED 455 765 IR 020 721

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TITLE	Formative Research on the Refinement of Web-Based Instructional Design and Development Guidance Systems for Teaching Music Fundamentals at the Pre-College Level.
PUB DATE	2000-10-00
NOTE	10p.; In: Annual Proceedings of Selected Research and Development Papers Presented at the National Convention of the Association for Educational Communications and Technology (23rd, Denver, CO, October 25-28, 2000). Volumes 1-2; see IR 020 712.
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Computer Assisted Instruction; *Distance Education; Formative Evaluation; Guidelines; Higher Education; Instructional Design; *Instructional Development; Instructional Improvement; Music Education; *World Wide Web
IDENTIFIERS	*Web Based Instruction

ABSTRACT

Recent advancements in computer and Internet technologies enable universities to implement cost-effective Web-Based Instruction (WBI) and to provide open learning environments 24 hours a day, 7 days a week. While more and more WBI courses are continually being developed, little attention is being paid to effective, systemic, and systematic WBI design and development. Although there are some general guidance systems focused on the WBI design and development much of the knowledge about these systems is tentative and lacking in details. The purpose of this research is to improve these guidance systems and to provide more detailed and useful guidelines in a special context. This research first synthesized general WBI design and development guidance systems. Next, formative research methodology was used to improve that synthesis. A case was chosen for this study, the context being the teaching of music fundamentals at the pre-college level. Efforts were made to identify which guidelines were or were not useful in this case and which guidelines might be beneficial to modify, delete, or add in this context. On-site and online interviews, observations, and document analyses were conducted with all developers involved in this WBI project. As a result of this study, the synthesized general WBI design and development guidance system was revised to best fit with this case. These revisions are the major findings of this research. Discussion of each guideline, and a final summary of the results are made. Recommendations for practitioners and future research directions are also discussed. This new guidance system is intended not only to guide future practitioners in this field, but also to provide a theoretical framework for future research and theory development. (Contains 28 references.) (Author/AEF)

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ED 455 765

Formative Research on the Refinement of Web-based Instructional Design and Development Guidance Systems for Teaching Music Fundamentals at the Pre-college Level

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Abstract

Recent advancements in computer and Internet technologies enable universities to implement cost-effective Web-Based Instruction (WBI) and to provide open learning environments 24 hours a day, 7 days a week. While more and more WBI courses are continually being developed, little attention is being paid to effective, systemic, and systematic WBI design and development. Collis (1996) mentions "WWW-based course environments are rapidly appearing, before there has been time for much theoretical development with respect to guidelines for their design" (p. 26). Although there are some general guidance systems focused on WBI design and development process, much of the knowledge about these guidance systems is tentative and lacking in details. The purpose of this research, therefore, is to improve these guidance systems and to provide more detailed and useful guidelines in a special context.

This research first synthesized several general WBI design and development guidance systems. Next, the formative research methodology was used to improve that synthesis. A case was chosen for this study, the context being the teaching of music fundamentals at the pre-college level. Efforts were made to identify which guidelines were or were not useful in this case and which guidelines might be beneficial to modify, delete, or add in this context. Both on-site and online interviews, observations, and document analyses were conducted with all developers involved in this WBI project.

As a result of this study, the synthesized general WBI design and development guidance system was revised for best fit with this case. These revisions are the major findings of this research. Discussion of each guideline and a final summary of the results were also made. Recommendations for practitioners and future research directions were also discussed. This new guidance system was intended not only to guide future practitioners in this field, but also to provide a theoretical framework for future research and theory development.

Background of the study

The single case in this study is a project called "Music Fundamentals Online (MFO)." According to the MFO project director, the typical undergraduate core in music schools in the United States consists of a four- or five-semester sequence of parallel courses in music theory and in musical skills (dictation, sight singing, keyboard, etc.), followed by one to two years of music history.

	1st semester [Fundamentals]	2nd semester
Year 1 (Freshman)	Theory and Literature I (T151), Musical Skills I	Theory and Literature II Musical Skills II
Year 2	Theory and Literature III Musical Skills III	Theory and Literature IV Musical Skills IV
Year 3	Theory and Literature V Musical Skills V	
Year 4	History I	History II

Table 1: Core curriculums at a typical music school (Isaacson, 1998)

An important part of the core courses is prior mastery of music fundamentals. The term "music fundamentals" refers to knowledge and skills associated with basic music literacy. Typically it includes the ability to read treble and bass clefs, to write and identify scales, intervals, key signatures, and chords, and to know basic elements pertaining to music notation, rhythm, and meter. It also usually includes basic aural skills, such as recognition of intervals and chord types, the ability to write down simple pitch and rhythm patterns, and a limited

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amount of sight singing. Although it is important to have basic music skills before entering music schools, many students entering college who plan to have music as their major lack mastery of these basic skills. Take Indiana University for example. The MFO project director pointed out that over half of the students beginning the core curriculum lack proficiency in this area. Other institutions report figures ranging from 20-80% with 50% being typical (Isaacson, 1998). These students, therefore, require remediation.

Removing this deficiency at the college level is very expensive for both students and music schools--US$420-$1300 per student per semester as of 1999 for tuition at Indiana University (depending on the residency status), plus textbooks and other costs. It is expensive for the music schools, too, because schools need to hire extra instructors and allocate educational resources (classrooms, musical instruments, equipment, and so on) for this course. It is, therefore, to the student's and to the school's advantage that students arrive on campus with a solid grounding in music fundamentals. As a solution to this problem, Indiana University has taken the challenge and is developing an innovative WBI remediation course (MFO) in the hope of replacing the present classroom-based music fundamentals course. Students who register in MFO will devote four to six weeks to complete the whole course online. Upon completion of the prototype, the MFO program will be available during the summer before students enter college music schools.

Guidance Systems of WBI Design and Development

WBI is still in its infancy, and there is little research about WBI design and development guidance systems. A number of general-purpose guidance systems for WBI design and development, though general in nature and not usually intended for complex WBI courses, can illustrate both the trends and process involved. To limit the scope of the study, some guidance systems that focused mainly on GUI issues or product issues (e.g., Collis, 1997; Boyle, 1997; Harasim, Calvert, & Groeneboer, 1997; Hedberg, 1997; Santi, 1997; Dillon & Zhu, 1997; Horton, 2000) were intentionally omitted in this literature review because they are more product-oriented. Following are some of the general WBI design and development guidance systems.

Berge's Guiding Principles in WBI design

Berge (1998) first defines design as "planning the instructional programme events--building the blueprint to guide development and tryout" (p. 38). This definition is similar to Wien and Gunter's "design" stage of WBI (Wien & Gunter, 1998).

Berge also limits the scope of his WBI design guiding principles and excludes some of the guidelines for on-line moderating and teaching (more product-oriented). According to Berge (1998), rules such as "find unifying threads," "present conflicting opinions," and "a facilitator should encourage the participants to introduce themselves," are intentionally left out in his guiding principles as they are too narrowly focused on implementation and delivery of on-line teaching.

Berge (1998) made some key assumptions before presenting his guiding principles in WBI design. These key assumptions include:

- Learning is a lifelong process that is important to effective participation in cultural and economic life in a democratic society.
- Learning involves the development of a broad range of skills, knowledge, and, particularly, attitudes that can be and should be fostered in both formal and informal learning environments.
- Learning involves a social construction of knowledge. (Berge, 1998, p. 32)

He then listed eight guiding principles for WBI design and categorized them into three groups (Berge, 1998).

- **Pedagogical**
  - Define/describe and list the purpose(s) for each activity, level and type of social and instructional interactivity, and feedback that is desired.
  - Define the levels of teacher-control, guided-teacher-control, student control and group-control that are desired regarding each activity.
  - Density of content should be inversely related to the amount of synchronous communication within the Web-based educational learning environment.

- **Technical/support**
  - Recognize that while on-line environments such as the Web permit multiple-media, currently text and graphics are the easiest to use.
  - Use the principle of technological minimalism.
  - Adequate technical support and training for both student and instructor is essential.

- **Social**
  - An important goal of web-based learning is the creation of an environment of co-operation and trust among students and the instructor.
  - In general, synchronous communication is more expensive than asynchronous. Still, both synchronous and asynchronous modes of communication are important web-based tools in teaching and learning (Berge, 1998, p. 33).

First of all, among all of Berge's guiding principles, some of them seem to be rather descriptive and lack detailed instruction or action to tell practitioners what to do and how to do it. For example, the guideline "Density of content should be inversely related to the amount of synchronous communication within the Web-based educational learning environment" does not include further instruction about "how to do it." This guideline is also considered to be somewhat product-oriented, as a more process-oriented guideline would be "Analyze the density of content to be taught within the Web-based learning environment." The other descriptive guideline is "Recognize that while on-line environments such as the Web permit multiple-media, currently text and graphics are the easiest to use." Also, since this is a general-purpose WBI design guidance system, some of the guiding principles tend to be general or imprecise. For example, the second principle in the pedagogical group can also be an ISD principle and not specifically a WBI design principle. There are many different genres of WBI courses. Some WBI courses are more like on-demand CBI (Clark, 1996) or CMI delivered via the Web. Whether all WBI courses require social activities as Berge suggested (in his assumption) is debatable. It will be beneficial to improve these guiding principles in a specific context based on formative research.

Welsh's Event-Oriented Design (EOD) Model for WBI

As Welsh (1997) pointed out, "those designing instruction that uses the Web as the primary means of communication between class participants need instructional development models that take into account the current and future capabilities of the Web, as well as its evolving limitations" (p. 159). Welsh first mentioned that any instructional design model for WBI must meet the following criteria:

1. It must be systematic, and therefore useful as a standard online course development methodology.
2. It must be adaptable to different educational disciplines and to differing pedagogical orientations.
3. It must be technology independent, incorporating technologies in wide use for instruction, as well as new technologies such as the Web.
4. It must be useful in traditional contexts so faculty can recognize the benefits of the design approach in instructional contexts other than WBI (Welsh, 1997, p. 160).

According to Welsh (1997), the EOD model involves consideration of three elements that draw from the fields of distance education and instructional design. These three elements are "asynchronous vs. synchronous learning, specification of performance objectives and the determination of instructional strategies for meeting objectives, and specification of information technologies best suited to meet instructional goals in distance contexts" (p. 160).

In the EOD model, first a course is conceptualized as a series of individual modules. Each module is comprised of a series of instructional events, each of which results in students meeting specific performance objectives. In summary, designing for WBI using the EOD model involves the following steps:

1. Specify instructional goals and performance objectives of the course using traditional instructional design methods.
2. Sequence performance objectives and chunk them into a series of instructional modules, each of which results in students meeting objectives. While instructional modules need not be equal in duration or scope, parallel structuring can establish a comfortable rhythm for the students and instructor.
3. Divide each module into a series of instructional events
4. For each event, specify event types: full synchronous, limited synchronous, or asynchronous.
5. For each event, specify appropriate Web-based technology to enable the event. Care should be taken to choose only from Web-based technologies available to the instructor and all students.
6. For each event, develop Web-based content where needed and define procedures that ensure smooth completion of the event.
7. Engage in formative evaluation and pilot testing as necessary to verify that each event, as well as the course as a whole, is robust pedagogically and procedurally (Welsh, 1997, p. 162-163).

Although Welsh (1997) does not define what he means by "parallel structuring," according to this article (Welsh, 1997), he was referring to the sequencing and chunking of the course modules (e.g., similar sequencing

structure, duration, or scope for each instructional module). While Welsh's EOD model tries to model WBI after traditional classroom-based instruction, I agree with other scholars (Khan, 1997; Relan & Gillani, 1997) that WBI may have the potential to be more flexible and powerful (e.g., more individualized or personalized instruction) than traditional classroom-based instruction. Also, although ideally it would be great to have a guidance system that is adaptable to different educational disciplines and to differing pedagogical orientations, this is a goal that cannot be easily achieved. To be more adaptable to different educational disciplines and to differing pedagogical orientations, a guidance system sometimes tends to be more general and lack specifics and details for a certain context. The EOD model can also benefit from formative research and more case studies for further improvement.

Gibson and Herrera's Case Study

Gibson and Herrera (1997) did a case study "How to go from classroom-based to online delivery in eighteen months or less: A case study in online program development." They described how a traditional undergraduate classroom-based course was redesigned to online delivery and the several stages of design and development. This study provided the following recommendations (guidance) for the WBI design and development process:

1. Decide upfront if your goal is to simply put some courses online or to design an entire online program. If the former, the resources needed are much less. If you are not sure whether your faculty or administration or even your technical system will support an online program, start by developing a few courses and offering them to current students.
2. Use an existing course of studies, hopefully one that you have had much success with so that you are not doing curriculum development and learning how to teach online at the same time.
3. Identify enthusiastic faculty champions right away. Faculty support is the most important element; you cannot succeed without it. We recommend that you choose only full-time faculty at the outset; bringing in outsiders will forever diminish the status of the program to "continuing education."
4. Allocate the financial resources to pay your faculty developers. Online development is very time consuming, and although you are providing new, marketable skills to the faculty participants, there is an opportunity cost to them.
5. Treat your developers as a team; hold frequent meetings. They need to share ideas and help each other stay focused. There is much frustration during the learning curve. Reinforce their work and recognize their accomplishments at every opportunity.
6. Make sure that technical support is readily available to faculty and students. This includes having the right software and hardware provided to faculty and, most importantly, having technical people ready to help the faculty whenever they may need it. Build in this same level of technical support for students when the classes begin.
7. Do whatever you can to assure that your university has an adequate online library. Students taking online classes are doing so for the freedom from logistical boundaries. The online library services, for example, provide students immediate access to a wide variety of full-text journals as well as e-mail, fax and regular mail access to everything else. (Gibson & Herrera, 1997, p. 5)

Compared to Berge's and Welsh's guidelines, Gibson and Herrera's guidelines are more detailed and specific, but also more situational. For example, if a WBI course is focusing on drill and practice (e.g., CMI delivered through the Web), it might not need to have an online library. Some of these guidelines (e.g., number seven) are also more product-oriented. These guidelines can benefit from further evaluation, and improvements can be made to provide more guidance.

This review of literature reveals that current guidance systems for WBI design and development are too general and lack detailed guidance. Some of the guidelines are also descriptive and do not offer detailed instructions about how to "do" it. For a practitioner who wants to create a WBI course in the context of music education at pre-college level, the general guidance systems reviewed above simply cannot provide sufficient guidance. Therefore, these general guidance systems can benefit from more empirical case studies for further refinement and improvement, especially for a specific context.

Methodology

Phase I: Synthesis of WBI Design and Development Guidance Systems

There were two phases in this study: an initial synthesis which focuses on theory creation, and formative research which focus on theory improvement. During the phase of initial synthesis, all of the guidelines from

different WBI design and development guidance systems were kept in their original form but were organized into four categories: technology, pedagogy, implementation, and others. Similar guidelines were also grouped together for easier comparison. The initial organization was suggested by one of the developers to facilitate the brainstorming process during the formal interview sessions. This organization later was revised (as suggested by Reigeluth) based on chronological order as we thought this would help the practitioners more.

Phase II: Naturalistic Formative Research Study and Rationale

The purpose of this phase was to try to suggest improvements for the synthesized guidance system based on the empirical evidence gathered in a single case study, the context being in the teaching of music fundamentals at the pre-college level. The formative research methodology was chosen. Formative research is a type of developmental research or action research that is intended to improve a design theory for instructional practices or processes (English & Reigeluth, 1996; Reigeluth & Frick, 1999). It was originally derived from formative evaluation, which has the primary goal of improving an instructional product while it is being developed in order to achieve the objectives for which it was designed (Beyer, 1995; Dick & Carey, 1996). Reigeluth and Frick (1999) further point out that "for an applied field like education, design theory is more useful and more easily applied than its descriptive counterpart, learning theory" (p. 633). The focus of formative research, therefore, is to improve a design theory (instructional theory) and to provide detailed prescriptive guidance.

Results

After comparing and triangulating the developers' comments with other data sources plus my own synthesis and observations, a revised set of guidelines was generated. This revised set of guidelines was then sent to each developer for further comments and elaboration. Some of these guidelines were shifted to different phases based on developers' further comments, but no new guidelines were added. The following guidelines are the final results. Note that "New" stands for new guideline generated from the formative research, "Mod" stand for modified guidelines (from original source), and "Orig" stand for original, unchanged guidelines.

[Analysis and Planning Phase]

- Evaluate all possible instructional solutions. (New)
  - Conduct a survey to see if other schools have similar instructional problems and see if they already found a good solution to the problem.
  - If other schools have found a good solution, evaluate their solution to see if it fits into your own situation. If no schools have a good solution, evaluate other possible solutions.
  - Justify the technologies or solutions you choose.
  - Analyze cost/benefit issues beforehand.
- Assess the readiness of the community. (New)
  - Make sure that the intended audience has the proper equipment and Internet connections to access the WBI course.
  - Make sure that the intended audience will accept WBI as an instructional approach.
  - Make sure that the host institution has the proper network infrastructure to support the WBI course.
- Secure in advance the financial resources to pay your developers. (Mod)
  - Develop a detailed budget to accurately anticipate costs.
- Get support from faculty members and other stakeholders. (Mod)
- Identify enthusiastic faculty champions right away, and get them involved with the project. (Mod)
  - Choose only full time faculty at the outset.
- Decide upfront whether to implement an entire course online or just selected lessons. (Mod)
- Use an existing course of studies for your curriculum development if possible. (Mod)
- Start by developing small modules and test them at early stages of development. (Mod)
- Conduct a task analysis, and list all required tasks in as much detail as possible. (New)
- Treat your developers as a team, hold frequent meetings. They need to share ideas and help each other stay focused. There is much frustration during the learning curve. Reinforce their work and recognize their accomplishments at every opportunity. (Orig)
- Make sure that the project director knows about current computer/web-based technology. If not, find an interface person who can explain things to the director and act as a bridge. (New)

- The project director should be one of the developers or part of the development team if possible. (New)
- Make sure that all developers are familiar with the content and have experience teaching with the content area if possible. (New)

[Design Phase]

- Write down your instructional objectives in detail and list resources required. (Mod)
- When possible, use an existing course as a model to develop your instructional modules to speed up the design process. (Mod)
- Conceptualize a course as a series of individual modules, with each module comprised of a series of instructional events. (Orig)
- Sequence performance objectives and chunk them into a series of instructional modules, each of which results in students meeting objectives. When possible, employ *parallel structuring* to help establish a comfortable rhythm for the students. (Orig)
- For each event, specify appropriate technology to enable the event. Care should be taken to choose technologies available to all students. (Mod)
- Create a safe, non-threatening, and reliable online learning environment for the learners.
  - Make sure the learners feel comfortable performing at an early stage of learning.
  - Use early encouragement and reassurance to help the learner feel comfortable about making initial mistakes.
  - Build up trust between learners and the online learning system. The system should be reliable enough so that students can trust the online learning technology and don't have to worry about losing their completed tasks.
- Engage in formative evaluation and pilot testing as necessary to verify that each event as well as the course as a whole is robust pedagogically and procedurally. (Orig)
- Define/describe and list the purpose(s) for each activity level and the type of social and instructional interactivity and feedback that is desired. (Orig)
- Define the levels of teacher/computer control, student control, and group control that are desired regarding each activity. (Mod)

[Development Phase]

- Build up a knowledge-sharing and proactive working culture and promote innovation in your development team. (New)
- Evaluate and choose adequate course authoring/development tools at early development stages. (New)
- Hire courseware developers who are familiar with the course authoring/development tools you choose. (New)
- Build a simple group Intranet to share design documents among team members. (New)
- Use an Instant Messenger program (or other communication tool) when necessary for better team communication. (New)
- Subscribe to or monitor newsgroups/listservs of the development tools you are using. (New)
- Make sure that staff engagement and commitment are happening in your team, as it is very important to the success of the WBI design and development process. (New)
- Use the minimum technology required to achieve the instructional objectives. (Mod)
- Keep the online media (e.g., multimedia files) size as small as possible. (Mod)
- Develop a sub-system in your WBI to capture each student's problem solving process. This sub-system should be able to: (New)
  - Keep a history of students' correct answers.
  - Determine if mastery has been reached. The mastery criteria can be made of three parts:
    - A minimum number of problems that must be attempted
    - A maximum history list length (often the same as minimum number of problems to try)
    - A minimum percent correct of the problems being counted.
- Test your prototype on multiple platforms and browsers at early stages of development. (N)
  - Be aware that web pages on different browsers and different platforms can look very different.
  - Identify any cross-platform compatibility problems as early as possible.

- Provide adequate technical support for students in a Web-based instruction environment. (N)
  - Provide email or telephone technical support to answer students' technical questions.
  - Build up a knowledge base for the most frequently asked technical questions.

Conclusions and Recommendations

Conclusions

It was not possible to examine all aspects of WBI design and development guidelines and generate a perfect guidance system by synthesizing several general WBI design and development guidance systems and analyzing empirical evidence in a single case study. Therefore, this study is just a beginning, and more studies are needed to further confirm and elaborate the findings in this study.

First, as Powell (2000) mentioned:

Choosing Internet technologies to deliver training should occur only after careful consideration of a number of factors. These factors include what is taught, who is taught, where the learning takes places, how the teaching is supported, and when the teaching takes place. (p. 1)

Schools that are interested in WBI should analyze every possible solution before making the decision, as WBI might not be the best solution in a lot of situations and learning domains. Most of the media choices are done not for instructional purposes, but for implementation purposes (Powell, 2000).

Every WBI needs to be supported by instructional theory. Kulp (1999) identifies three instructional models and relates each to the learning objectives for which it is best suited (see Table 2).

	Instructional Model	Learning Objectives	Learner Activity	Collaborative?
1	Instructor centered	Information transfer	Passively receiving	No
2	Learner centered	Skill acquisition	Actively interpreting, practicing, questioning, challenging, discussing	Yes
3	Learning team centered	Mental model change	Collaboratively creating new knowledge	Yes

Table 2: Instructional models and learning objectives (Kulp, 1999)

According to Kulp (1999), the most common genres in WBI courses are learner-centered topics. Students interact with material in the course web site in somewhat the same way they would with a computer-based training (CBT) self-study course (Kulp, 1999). They actively interpret information and experience in order to create new knowledge or build new work products of some type. Based on this assumption and Gordon's "Music Learning Theory," we can hypothesize that most of the guidelines supported by this case can also be useful in creating other skill-based WBI courses, although more research is needed to confirm this hypothesized generalization. For other skill-based pre-college remedial WBI courses, the guidelines provided in this study might also be useful.

Secondly, in this study, not many guidelines were rejected. This indicates that most guidelines were useful based on the empirical evidence for this case. Some guidelines were refined to better fit in with this context of creating a WBI course at the pre-college level. One of the major findings in this study is additional guidelines and further elaboration of the original synthesized guidance system in this specific context. Also, some "holes" in the original synthesized guidance system were found, and new guidelines based on the experience from this case study were identified to fill those holes. But note that in a single case, there can be no evidence for further generalization; therefore the results cannot be generalize beyond this case. Only hypothesized generalizations can be offered, as mentioned above.

Finally, As Reigeluth and Frick (1999) pointed out:

> It should be patent that the development and testing of design theories is not a one-trial endeavor. It is a matter of successive approximations. Such theories continue to be improved and refined over many iterations (p. 635).

Further studies are needed to further refine and elaborate the findings generated in this study.

Recommendations

The recommendations in this study fall into two categories: recommendations for future WBI practitioners and recommendations for further study. For developers, I recommend to apply guidelines supported by this study that best fit in with your own project and to apply them with caution. Even though I pointed out the contextual influence, and the elaborated and new guidelines in this study look promising, this is just one case study. For a single case study, generalization can't really be made beyond the context of music fundamentals instruction because of lack of other research to support those generalizations. Further studies are needed to confirm those findings before we really have confidence in their generalizability.

Further study is recommended to continuously elaborate and refine the WBI design and development guidelines for the context of teaching music fundamentals at the pre-college or college level. As this study only covered the design and development phases, there is still plenty of room for further elaboration and refinement in this context, especially to include guidelines for the implementation and evaluation phases. Secondly, I recommend future research to address other learner age groups and the content areas. For example, WBI might be a good solution/medium for pre-college or college learners, but how about younger or older learners? Also, how about other types of music courses such as music history or advanced music theory courses? Will the WBI design and development guidelines concerning these different content domains or age groups be different from the guidelines provided in this study? Further research in this area can help us get a sense of the generalizability of the guidelines supported by this study. Finally, the product of the MFO project--the WBI course--also needs some research. At the time of this writing, the MFO team was just about to start their larger-scale final beta testing of its prototype and will have more revisions in the future. So further formative research on the ongoing MFO project is highly recommended to generate product-oriented guidelines. This is an important part of my research agenda for the near future. Other recommended product-oriented research directions include:

1. Learning styles and WBI: Learning styles deal with characteristic styles of learning. Kolb (1984) proposes a theory of experiential learning that involves four principal stages: concrete experiences, reflective observation, abstract conceptualizations, and active experimentation. He also postulates four types of learners: assimilators, divergers, convergers, and accommodators. For example, Kolb (1984) points out that an accommodator prefers concrete experiences and active experimentation. Pask (1988) also has described two learning styles: serialist and holist. According to Pask (1988), serialists prefer to learn in a sequential fashion, whereas holists prefer to learn in a hierarchical manner. As WBI is more flexible and powerful in the way that it can provide more *individualized* or *personalized* instruction, it will be interesting to conduct research to investigate what kind of instructional strategies or approaches would be most effective in a WBI product and their relationship with different cognitive and learning styles.
2. Music aptitude and WBI: In the past, musical ability was often viewed in all-or-none terms: some are blessed with "talent," others must do without. Recent research (Gordon, 1993; Baney, 1999), however, reveals that music aptitude, like all human characteristics, is normally distributed in the population. Relatively few have high aptitude, a similar number have low aptitude, and the majority of persons fall somewhere in the middle of the "bell curve" with average aptitude. In another words, most persons have the potential to achieve in music. It will be interesting to see how people with different music aptitudes interact with Web-based courses such as MFO. More research is recommend to find out the relationship between music aptitude, music learning theory (Gordon, 1997), and WBI.

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